European Commission

GovTech: influencing factors, common requirements and recommendations

Supporting the development of cross-border, interoperable GovTech practices in the European landscape

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Editor: Manzoni, M.

2024

Joint Research Centre

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Abstract

Digital transformation is essential for modern, effective and user's centric public administrations. Within public sector operations, *Public Procurement* is the most common way for public administrations to acquire innovative digital solutions if not developed in-house. In this important area that accounts for 14% of the GDP in Europe, there is a need to identify and understand the influencing factors affecting the uptake of innovative digital solutions designed for and adopted by public administrations specifically through *GovTech practices* to support a successful digital transition and modernisation of the public sector in Europe.

For the purpose of this study, GovTech is defined as the collaboration between public administrations and private sector start-ups and SMEs, for the design, development and acquisition of innovative digital solutions to support the provision of innovative and inclusive public services. It complements existing public sector capability for agile, user-centric, responsive, and cost-effective processes and services and aims to contribute digital government maturity.

While building on previous research in the area, this work focuses on the uptake of innovative digital solutions for the provision of interoperable public services specifically in cross-border and multilevel governance systems, and their policy implications with particular attention to the *Interoperability Act*.

With this in mind, the study analyses GovTech practices for the public sector acquisition of innovative digital technologies focusing specifically on the engagement of Start-ups and SMEs in the design, provision and management of procured interoperable innovative public services.

In this context, what are the key Success Factors for cross-border GovTech success? This study attempts to identify key barriers and opportunities for the wider uptake and deployment of cross-border GovTech solutions in the European Union. The study is based on an extensive literature and policy review of the last 10 years, as well as insights from qualitative interviews with 111 GovTech founders in 17 EU Member States and 2 workshops with domain experts, public sector practitioners and policy makers. The researchers analysed both national and European GovTech programs.

The study identified seven key dimensions that shape cross-border GovTech practices, with policy as the dominant influencing factor. These dimensions are policy and regulation, finance and markets, culture and language, framework support, human capital and technology. The study also highlighted a tension within the GovTech environment, trying to balancing political goals with economic interests.

Whether importing from cross-border or exporting GovTech solutions, understanding the balance between policy, finance, culture, support activities, human capital markets and technology is crucial for success in the evolving GovTech landscape, and in shaping policies that enhance modernisation in the public sector, EU's digital sovereignty and technological independence.

The results stemming from this work, their policy implications and the resulting recommendations articulated in a number of actions addressing different stakeholders in this area are particularly relevant for informing and shaping current and future policy measures aimed at creating a cohesive digital market and driving innovation within public services across Europe.

Acknowledgements

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Executive summary

Policy context

The European Commission has put digital transformation at the heart of its policy agenda with its Communication on Europe's Digital Compass. Digital technologies and innovation play a critical role in enabling access to a wide range of services, and in this context, the Commission is increasingly emphasising digital sovereignty. Europe is to develop its digital capacities and infrastructures rather than depending on others.

The ongoing digital transition, and related challenges to achieve the targets set for Europe's Digital Decade to 2030, are well recognised in the European Union policies, especially by the 'Europe Fit for the Digital Age' priority of the European Commission, its revised Digital Strategy, and the ambitious agenda put forward by the Recovery Plan for Europe.

In parallel to these large EU funded initiatives, a rich set of regulations emerges that should help public governance and societal well-being in light of digital transformations in our daily lives, including policymaking and the provision of public services. Most prominently, these regulations include the Data Governance Act, the Digital Services Act, the Digital Market Act, the AI Act and the Data Act, all of them under the umbrella of the Digital Decade Policy Program.

In support of the above EU regulatory landscape and related initiatives, by investing in and upgrading technology within governmental operations, the EU is setting the stage for more efficient and transparent governance, thereby ensuring that public services meet the needs of its citizens through high-quality digital solutions.

Within public sector operations, *Public Procurement* is the most common way for public administrations to acquire innovative digital solutions if not developed in-house. In this important area that account for 14% of the GDP in Europe, there is a need to identify and understand the influencing factors affecting the uptake of innovative digital solutions designed for and adopted by public administrations specifically through *GovTech practices* to support a successful digital transition and modernisation of the public sector in Europe.

For the purpose of this study, GovTech is defined as the collaboration between public administrations and private sector start-ups and SMEs, for the design, development and acquisition of innovative digital solutions. GovTech reflects the need for collaborative public governance, creates room for strategic partnerships, and complements existing public sector capability for agile, user-centric, responsive, and cost-effective processes and services while aiming to contribute to the achievement of digital government maturity.

While building on previous research in the area, this work focuses on the uptake of innovative digital solutions for the provision of interoperable public services specifically in cross-border and multilevel governance systems, and their policy implications with particular attention to the *Interoperability Act*.

On the one hand, it should help public administrations to identify, develop and integrate successful innovative GovTech solutions in Europe. On the other hand, it should help European SMEs (and start-ups) to provide re-usable and interoperable solutions so that they might scale up their market and reach out either in national or cross-border contexts.

With this in mind, the study analyses GovTech practices for the public sector acquisition of innovative digital technologies focusing specifically on the engagement of Start-ups and SMEs in the design, provision and management of procured interoperable innovative public services.

The study provides insights from more than 111 GovTech founders, offering a comprehensive view of the landscape that is shaping the future of governmental technologies in Europe. These insights are invaluable for understanding the practical challenges and opportunities these innovators face when supplying innovative technologies to Public Administrations, while building the basis for informed policymaking.

The key issues at stake identified by the study in this area are the regulatory fragmentation and the **widely applied "preferential"**[1] procurement practices, both greatly undermining the interoperable cross-border portability and scalability of GovTech solutions. These challenges are significant as they affect the EU's ability to maintain technological autonomy and competitive advantage, and while nurturing the development of the local economy driven by innovative start-ups and SMEs, they stand as barriers for the modernisation of the public sector and its public administrations at all level of governance.

The report is the first of its kind and, besides providing empirical data, it identifies seven key areas of interventions building the framework that defines the challenges and opportunities, leading to the identification of policy recommendations to support the harmonisation and implementation of regulations, and the streamlining of procurement processes. The report also suggests a number of possible actions addressing relevant stakeholders to foster innovation across the multi-level governance of public administrations in Member States.

The report is also timely, informing ongoing debates about the implementation of the Digital Markets Act and the upcoming European AI Act. Additionally, its conclusions are applicable to broader EU policies, including the Single Digital Gateway Regulation and the European Data Strategy, emphasizing the need for a cohesive approach to digital governance and public sector innovation.

Key conclusions

This study reveals that the key and most common factors hindering cross-border GovTech practices, reusability and scalability of innovative solutions are preferential procurement practices and regulatory inconsistencies leading to many other significant obstacles to the growth and spread of innovative public sector solutions across borders

This study's findings bear considerable implications for the EU's digital policy framework and its implementation, particularly in terms of regulatory harmonization and procurement practices. The primary policy-relevant consequences include the need to harmonise regulations across Member States, the need to compel their implementation and simplify public procurement processes to foster interoperability and the cross-border scalability of GovTech solutions.

To address these challenges, it is essential to establish uniform EU-wide standards (e.g. for data and APIs, along with the promotion of open data initiatives), thereby minimizing additional national

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[1] In the context of this study, preferential practice means Public Administrations giving preference to domestic and/or local suppliers/actors.

regulation requirements, particularly concerning GDPR compliance and the provision of re-usable Proof of Concepts.

Through the promotion of an *EU dedicated certification* or quality labels to GovTech actors can streamline compliance and build trust from public administrations also in non-domestic companies. Additionally, simplifying procurement processes by requiring tender translation will make procurement opportunities more accessible to international companies and non-native speakers.

Further policy options arise from the study analysis. For example, by establishing dedicated support platforms to provide regulatory and procurement-dedicated information on regulations, practices and innovative solutions, would ensure consistency and ease of access to vital information about GovTech opportunities across the EU.

Supporting open data initiatives by encouraging the adoption of open data and open-source criteria in public procurement can drive innovation and collaboration. Establishing GovTech showrooms, both physical and virtual, where companies can demonstrate their solutions to public sector officials from all over Europe, can foster trust and display product viability.

The report highlights also the importance of showcases and champions for the dissemination of good practices. Investing in IT training for public officials and establishing EU-wide entities and dedicated platforms to provide trainings and facilitate cross-border hiring are also important to promote and nourish long-term innovation towards public sector modernisation.

However, no change comes without risks. For example, the potential resistance to change from public administrations, legacy constraints versus the need to adapt policy as well as operational parameters and framework conditions to foster successful innovative practices, their necessary pre-conditions and resulting implications on relevant actors and their power dynamics, lastly yet importantly, the need for substantial initial investment from both the suppliers and procurers side.

While reducing some uncertainties by providing empirical data and actionable policy recommendations, the study underscores the need for further research to understand the specific technical, legal and organizational challenges of transposition of EU regulations, in order to connect the complex operational environment that characterise the multi-lever governance of European public administrations. Long-term studies that track the performance and impact of cross-border GovTech initiatives over time are also needed to understand their effectiveness and sustainability.

Main findings

The study confirms that regulatory fragmentation and preferential procurement practices are major barriers to the growth and cross-border scalability of GovTech companies. Despite EU-wide regulations, individual countries impose additional requirements, complicating compliance and increasing costs. These regulatory inconsistencies, along with varying interpretations of data protection laws like GDPR, create uncertainty for GovTech companies operating across different regions.

It also identifies new issues, such as significant cultural barriers and the lack of adequate support infrastructure. In this context, the study found seven interlinked areas of success: policy, finance, culture, support, human capital, markets and technology each of them bearing significant policy implications also in respect to the Interoperability Act.

GovTech companies face significant financial challenges, including high development and scaling costs, reliance on public funding and limited access to non-home market funding. The dependency on public funds means that any changes in government budgets or priorities can significantly affect GovTech projects. Simplifying funding applications and promoting standardized solutions are essential to reduce costs and support scalability.

Cultural differences, including trust and credibility issues, resistance to change and language barriers, pose significant obstacles to the adoption and integration of GovTech solutions. Public administrations often prefer local providers, creating an additional hurdle for foreign GovTech companies. Promoting certification processes to enhance credibility and promoting cultural exchange programmes may help mitigate these issues.

Many GovTech start-ups lack access to essential support structures, such as legal, financial and networking services. The absence of platforms for displaying and scaling solutions across different countries limits the visibility of innovative GovTech products. Establishing dedicated institutions and developing networking platforms can provide necessary support and enhance the visibility of GovTech solutions beyond country borders.

Cross-border hiring challenges and a lack of IT training for public officials impede the growth and effectiveness of GovTech companies. From the perspective of this study, standardizing employment laws across the EU and providing comprehensive IT training programmes for public officials might contribute to addressing these issues.

Challenges in accessing decision-makers, the lack of visibility in pan-European procurement platforms and the demand of several proof of concept projects hinder the market expansion of GovTech companies. Enhancing procurement directories, ensuring tender translation and establishing GovTech showrooms and champions can improve market access and build trust in public administrations.

Inconsistent data standards and difficulties in integrating with local IT infrastructures pose significant technological barriers. Promoting standardized data and APIs, along with open data initiatives, can drive innovation and enhance interoperability.

These findings highlight the need for harmonized regulations, simplified procurement processes, robust support infrastructure, standardized employment laws and technological standardization to foster a thriving GovTech ecosystem in Europe.

This study has clarified critical issues and provided actionable recommendations, offering a path forward for fostering public sector modernisation and enhancing the EU's digital sovereignty and technological independence.

Related and future JRC work

The European Commission Joint Research Centre (JRC) is the science and knowledge service of the European Commission with the mission to support EU policies with independent scientific evidence throughout the whole policy cycle, by supporting and collaborating with many policy DGs.

With the priorities of the European Commission, DIGIT and JRC continue making essential contributions in supporting EU policies and related. Particularly the priorities set out in the Digital Europe Programme (DIGITAL). The recent strategic partnership between the JRC and DIGIT focuses on interoperability and digital government policies. It aims to help drive the digital transition of public

administrations and public governance processes across the EU. More specifically, it helps to advance the digitalisation of European public administrations focusing on four complementary objectives:

1. Strengthen the interoperability of public administrations in Europe
2. Support the monitoring of digital transformations in digital governance
3. Understanding and promoting the use of AI and emerging technologies in the public sector
4. Assist in community building for digital governance in Europe.

The package of activities supporting those objectives is named "Innovative and Interoperable Public Administration and Services" (I²PAS) and is financed under the European Digital Government Ecosystem (EDGES) Chapter of DIGITAL

The current report is one of the research results under I²PAS. In particular, it contributes to the identification and analysis of GovTech practices for the public sector acquisition of innovative digital technologies focusing specifically on the engagement of start-ups and SMEs in the design, provision and management of procured innovative public services.

Within this framework, GovTech plays a pivotal role in enhancing our understanding of how digital technologies can be leveraged to enhance public services in Europe.

Quick guide

This report examines the barriers and opportunities for GovTech solutions in Europe, focusing on critical success factors.

In the first part of the report key feature of GovTech ecosystem and its landscape of actors is explained, including terms like "GovTech" (Government Technology), "digital sovereignty" (EU's control over its digital destiny) and "regulatory fragmentation" (inconsistent regulations across Member States).

In the second part, the methodology used to carry out the study is explained together with the Theoretical Framework underpinning its building blocks and related areas of success that are further identified and detailed in their characteristics, features and dynamics.

The third part of the report links the findings relating to each of the areas to policy and operational implications, resulting in a number of recommendations and possible actions addressing relevant actors of the GovTech arena at different level of governance.

The final part of the report summarises the main findings and related recommendations, and concludes by outlining open issues requiring further attention and dedicated research.

1 Introduction

1.1 Background on GovTech in the European Union

The EU is increasingly emphasizing the use of domestically developed technologies within its public sector institutions, demonstrating a strong dedication to innovation and autonomy (Vučić, 2021). By focusing on homegrown solutions, the EU not only supports its technology sector but also ensures that its public services are equipped by secure and reliable technology created within its own borders.

Despite existing challenges, companies in the European Union are progressively succeeding in scaling their operations across borders, thus establishing themselves as significant players on the global stage (Vučić, 2021). The European Union is committed to cultivating a digitally proficient Europe, emphasizing the enhancement of public sector technology (Blancato, 2024). This focus is part of a broader strategy to foster a sovereign and innovative digital landscape across Europe (Vučić, 2021).

The ongoing digital transition, and related challenges to achieve the targets set for Europe's Digital Decade to 2030, are well recognised in the European Union (EU), especially by the 'Europe Fit for the Digital Age' priority of the European Commission (EC), its revised Digital Strategy, and the ambitious agenda put forward by the Recovery Plan for Europe. The EU's response to the crisis (Recovery and Resilience Facility (RRF) provides an unprecedented and powerful opportunity for the Union to become stronger, more resilient and better prepared for future challenges.

In parallel to the large funding initiatives, a rich set of regulations emerges that should help public governance and societal well-being in light of digital transformations in our daily lives, including policymaking and the provision of public services. Most prominently, these regulations include the Data Governance Act, the Digital Services Act, the Digital Market Act, the AI Act and the Data Act, all of them under the umbrella of the Digital Decade Policy Program.

In support of the above EU regulatory landscape and related initiatives, the Interoperability Unit of DG DIGIT (DIGIT.B2) and the Digital Economy Unit of the JRC (JRC.T1) established a long-term strategic partnership on interoperability and digital government policies development, including investigations on the uptake and use of emerging technologies in the public sector. By investing in and upgrading technology within governmental operations, the EU is setting the stage for more efficient and transparent governance, thereby ensuring that public services meet the needs of its citizens through high-quality digital solutions.

GovTech, short for *Government Technology*, which integrates innovative technology into government and public administration operations, plays a pivotal role in transforming public services, making them more efficient, transparent and accessible. This sector is crucial for the EU as it seeks to enhance administrative capabilities and foster citizen engagement through innovative digital solutions. Consequently, making full use of the potential of GovTech is essential for realizing the EU's strategic ambitions of digital sovereignty and technological independence.

Different actors have coined the term GovTech, for different purposes. The World Bank defined GovTech as "[…] a whole-of-government approach to public sector modernization that promotes simple, efficient, and transparent government, with citizens at the center of reforms" (World Bank, 2021). This falls short, as innovation and vendor independence are underrepresented.

For the purpose of this study, we follow Bharosa's definition: "GovTech refers to socio-technical solutions – that are developed and operated by private organizations – intertwined with public sector components for facilitating processes in the public sector" (Bharosa, 2022), with an additional focus on GovTech start-ups and small and medium-sized enterprises (SMEs).

For the purpose of this study, GovTech is defined as the collaboration between public administrations and private sector start-ups and SMEs, for the design, development and acquisition of innovative digital solutions to support the provision of innovative and inclusive public services. It complements existing public sector capability for agile, user-centric, responsive, and cost-effective processes and services and aims to contribute to achieve digital government maturity.

GovTech reflects the need for collaborative public governance. It creates room for strategic partnerships between the public and private sector to co-create innovative digital solutions. By fostering the participation of start-ups and small-to-medium enterprises, it also helps address the issue of legacy of big ICT vendors across government.

In fact, one of the advantages of applying SMEs based GovTech practices is that small companies use to work in an agile way and can bring this agility to the public sector procurement processes. This proves to be even more important when addressing interoperability (IOP), cross border operations, and contextualization of national and EU regulations into local and regional contexts

Despite the high quality of many GovTech solutions developed within the EU, GovTech companies often face significant challenges when trying to expand beyond their national borders. Regulatory diversity and market fragmentation can impede their growth. However, these challenges also highlight the resilience and innovative capacity of GovTech firms as they adapt and find ways to overcome these obstacles, demonstrating their potential to influence global markets (Darsch et al., 2007, Bharosa, 2022).

To facilitate cross-border expansion of GovTech companies, the EU has enacted various legislative measures, including the Interoperable Europe Act (IEA) and the Artificial Intelligence (AI) Act. These regulations are designed to harmonize standards across the EU, to reduce barriers to bringing products and services to market and to support the seamless integration of technology services across borders (Floridi, 2021). Such legislative frameworks are crucial for creating a conducive environment for technology businesses to thrive and expand their reach throughout the continent.

Policymakers seeking to enhance the cross-border practices of GovTech companies (short: GovTechs) need access to verified data on the factors that drive success and the obstacles encountered. This information is vital for understanding the ecosystem in which these companies operate and for designing policies that effectively support their growth and integration across different European markets.

In this study, we provide insights from more than 111 GovTech founders, offering a comprehensive view of the landscape from those who are making their contribution to shaping the future of governmental technologies in Europe. These insights are invaluable for understanding the practical challenges and opportunities these innovators face and they form the basis for informed policymaking.

In the interviews conducted during this study, we pursued the main research question, as follows:

"What factors critically influence cross-border GovTech practices in Europe, both positively and negatively?"

This question guided our inquiry into the dynamics that affect the scalability and effectiveness of GovTech solutions across different European jurisdictions.

This research aims to offer proposals for policy adaptations that could facilitate the cross-border activities of GovTech start-ups. By addressing identified challenges and leveraging opportunities, the proposed policies are designed to support the growth of GovTech firms, thereby enhancing their contributions to a more digitally sovereign and innovative European Union.

1.2 Related JRC Work on GovTech

The Joint Research Centre (JRC) of the European Commission within its collaboration with DIGIT has committed this work and been actively involved in the development of this study, while supporting GovTech initiatives across the European Union. The JRC mandate is to provide scientific evidence to its partner Directorates Generals of the European Commission to inform policymaking and, specifically in this case, support innovation in public services through various GovTech related activities and events.

This report shares valuable lessons learned from setting up government-run GovTech programmes, highlighting best practices and the common barriers faced by the public sector. It emphasizes the critical role of engaging start-ups and SMEs in the procurement process to ensure that innovative technology solutions are harnessed to improve public services. One example from their report is the "National Competence Centre for Innovation Procurement" in Austria that offers a certified marketplace for GovTechs and other public selling SMEs.

A recent JRC study, *GovTech Practices in the EU* (Kuziemski et al., 2022), provides an overview of the diversity of GovTech initiatives and shares lessons learnt for setting up government-run GovTech programs. Another significant JRC contribution is the in this area is the technical report titled *Scoping GovTech dynamics in the EU*, (Mergel et al., 2022), providing background information on GovTech dynamics in the EU and analysing how governments can leverage GovTech to drive innovation. It identifies various procurement models, explores barriers to innovation and outlines strategies employed by different governments to foster a supportive environment for GovTech. The report suggests that amongst the different types of public procurement methodologies, "adaptive" Public Procurement of Innovation (PPI) models are those that would meet public administrations' and their users' needs the best. This is because SMEs and start-ups are those partners offering the natural agile, adaptive ground and flexible practices to procure innovative digital solutions.

However, while being more agile, adaptive and often more innovative with respect to bigger companies in answering procurers' need (also in terms of interoperability and contextualisation requirements), for small enterprises the costs for complying with procurement processes are highly impactful on their resources. It is therefore important to support the innovative processes and practices of both SMEs and PAs, on the one hand for these small companies to enter the market, and on the other to allow public procurement processes the necessary agility and sustainability of their ecosystems (e.g. continuity and coherence in the maintenance).

Moreover, the report underscores the importance of interoperability and cross-border collaboration, as being essential for enhancing the scalability of GovTech solutions across the EU. Here, a conjunction with the IOA is visible, targeting topics of both public administrations, as well as GovTechs, reuse and sharing of openly assessable parts of their solutions.

In addition to these reports, the JRC has also published "*European Landscape on the Use of Artificial Intelligence by the Public Sector*" (Tangi et al., 2022), and *"Road to the adoption of Artificial Intelligence*

by the Public Sector: a handbook for policy makers, public administrations and relevant stakeholders"
(Manzoni et al., 2022). Although these reports primarily focus on AI, they provides valuable insights
into the role of GovTech in implementing AI solutions within public administrations. They discuss the
need for trustworthy AI, the importance of upskilling public sector employees and the challenges of
integrating AI technologies into public services. The reports suggest that GovTech initiatives can play
a crucial role in identifying relevant partners for AI projects and in facilitating the experimentation
and scaling of AI solutions.

While building on previous research in the area, this study focuses on the uptake by Public
Administrations of innovative digital solutions for the provision of public services specifically in cross-
border and multilevel governance systems. On the one hand, it should help public administrations to
identify, develop and integrate successful innovative GovTech solutions in Europe. On the other hand,
it should help European SMEs (and start-ups) to provide re-usable and interoperable solutions so that
they might scale up their market and reach out either in national or cross-border contexts.

In this context, the study will focus on GovTech practices for the public sector acquisition of
innovative digital technologies and, more specifically, on the engagement of start-ups and
SMEs in the design, provision and management of procured innovative public services. More
specifically, the study will identify concrete factors either enabling or hindering to be addressed, in
order to support and promote cross-border, multi-level GovTech practices in Europe.

This study complements the JRC understanding of the current state of public procurement for
innovation, the challenges and opportunities within the GovTech ecosystem, and provides
recommendations for enhancing GovTech practices.

While taking the form of a handbook, the study tries to:

- Identify examples of GovTech practices;
- Understand how cross-border interoperable and re-usable solutions can be designed, devel-
  oped and deployed;
- Provide insights of the impact of cross-border interoperable and re-usable solutions on the
  GovTech Actors and Users;
- Outline common IOP needs and re-usable solutions;
- Provide recommendations and guidance to SMEs and public administrations for the promotion
  of public services in cross-border and multilevel governance ecosystems.

Moreover, this study intends to provide input for the development of European policies and
complement EC current related activities in this area, such as the European Interoperability
Framework (especially on organizational interoperability), the Interoperable Europe Act, and the
Coordinated plan on Artificial Intelligence.

Despite the comprehensive nature EU initiatives, several research gaps in cross-border GovTech
practices yet remain. One major gap is the need for more detailed studies on the interoperability of
GovTech solutions across different national and regional contexts. While the importance of
interoperability is frequently mentioned, there is a lack of in-depth research on the specific
technical, legal and organizational challenges that hinder seamless integration of GovTech
solutions across borders.

Another significant research gap is the limited understanding of the cultural barriers that affect
cross-border collaboration in GovTech. While diverse national GovTech initiatives aim to foster trust

and collaboration in particular Member States, more research is needed to explore how cultural differences influencing the adoption and scaling of GovTech solutions in different EU Member States. This includes understanding the varying levels of digital literacy and public sector innovation readiness across countries.

Furthermore, there is a need for more empirical data on the economic impact of cross-border GovTech collaborations. Studies that quantify the benefits and cost savings associated with cross-border interoperability of GovTech solutions would provide valuable insights for policymakers and stakeholders. This data could help in making a stronger case for investments in GovTech and for harmonizing standards across the EU, as well as provide evidence for the level of contribution and value stemming from GovTech for the strategic objectives of digital sovereignty in Europe.

Additionally, the role of policy harmonization in facilitating cross-border GovTech practices requires further exploration. While the establishment of the *European GovTech Incubator, see above,* is a step in the right direction, there is limited research on how different regulatory frameworks across Member States may be aligned to support the seamless integration and scaling of GovTech solutions, as addressed in the IOA. Further research into national programmes and frameworks will be fruitful for more focused execution.

Lastly, there is a research gap regarding the sustainability of cross-border GovTech initiatives. Long-term studies that track the performance and impact of such initiatives over time are needed to understand their effectiveness and sustainability. This includes examining the governance structures, funding mechanisms and stakeholder engagement strategies that contribute to the success or failure of cross-border GovTech projects. Specific monitoring would allow deeper insights into the peculiarities of GovTech providers, specifically in comparison to other technology providers. We see potential in differentiating technological, social, market and provision innovation, e.g. hosting infrastructure.

The JRC's ongoing efforts in studying and supporting GovTech initiatives are vital for the digital transformation of the Public Sector in Europe. By addressing research gaps and providing evidence-based recommendations, the EU may further enhance the uptake of innovative public services, thereby increasing efficiency, transparency, trustworthiness and innovation in the public sector across Europe. This study is the first attempt to understand the influencing factors driving this area with the view to address common needs and share the opportunities brought about by innovative technologies, to ensure that the EU remains at the forefront of its Public Governance, while driving forward a more digitally sovereign and technologically independent Europe.

2 Analytical Framework Development

A robust public sector forms the backbone of a functioning democracy. It needs to embody the principles of transparency, accountability and responsiveness to uphold democratic values. However, challenges such as personnel shortages, outdated systems and bureaucratic inertia often impede the efficiency of public administration, necessitating innovative solutions to ensure the effectiveness of governance (Hassankhani et al., 2021).

Many democracies today struggle with the twin burdens of outdated infrastructure and a perennial shortage of skilled personnel (Colley, 2014; Niehaves, 2011). This situation is compounded by bureaucratic processes that have not kept pace with the speed of societal changes, creating a gap between citizen expectations and governmental capabilities (Sundberg & Holmström, 2024). The resulting inefficiency impact trust in public institutions, thereby weakening the democratic fabric (Marozzi, 2015).

To counter these challenges, there has been a growing emphasis on embracing digital innovation, particularly through collaborations with *GovTech companies* (Bharosa, 2022). These enterprises specialize in *creating technological solutions tailored to the needs of government operations, aiming to streamline processes, enhance communication and improve adaptability within public sectors* (Kolain & Hillemann, 2022).

Our empirical study builds on three pillars. We use a GovTech programme review, a theory-driven analysis and interview-based empirical reflexions (see Figure 1), as well as focus groups for further empirical validation. For our programme review, we analysed GovTech associated programmes starting from the best-ranked e-government countries within the EU (Rorissa et al., 2011). This analysis provided insight into how these nations harness digital tools to support public administration services. These three pillars are based on a theoretical framework for our study anchored in Isenberg's entrepreneurial ecosystem theory, which posits that *successful entrepreneurship depends on a dynamic interplay among a set of cultural, financial, market, support, human capital and policy factors* (Isenberg, 2016a). Applying this theory, we developed a framework specific to GovTech innovation. To validate our framework and its generate data, we conducted a series of interviews, completing validation checks after every ten interviews (Döringer, 2021; Kaiser, 2021). This iterative process allowed us to refine our understanding continually and adapt our framework based on real-world inputs and data collected through these interactions.

Figure 1 Methodological Approach
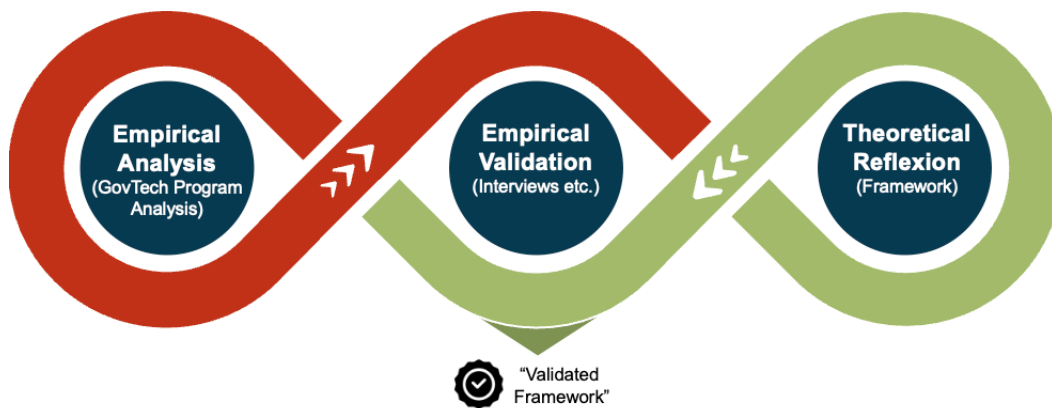
2.1 GovTech Initiatives Review

Studying successful GovTech initiatives provides a rich source of knowledge that can inform the development of new strategies. This practice not only helps to avoid the repetition of past mistakes but also increases opportunities that can lead to effective solutions supporting public sector digital transformation. These insights are crucial for shaping future GovTech strategies that are both innovative and practical.

The awareness of existing initiatives not only prevents redundancy but also facilitates collaboration and partnerships. By *identifying areas where resources and goals align, different entities can combine their efforts to achieve greater impact*. This collaborative approach is particularly effective in areas such as cross-border standardization and community building, where shared standards and knowledge can significantly enhance the efficacy and reach of GovTech solutions.

Table 1 provides an overview over various GovTech-related initiatives sponsored or supported by national programmes. The focus is on displaying the breadth of projects and their intended impacts on improving public digital services across Member States.

Table 1 National GovTech Initiatives

EU-State	Initiative	Implications for GovTech Practices
Denmark	AI hotspot based on trust	National initiative
	Digital Hub Denmark	Incubator hub
	Global Start-up Awards	Incentive structure for start-up and award system
Sweden	Swedish Association of Local Authorities and Regions (SALAR)	Organization comprised of local authorities
	eGovernment State of Play	eGovernment structure to support citizens and start-ups
	European Blockchain Partnership	Partnership with European Commission to provide blockchain technology

Estonia	Enterprise Estonia	Innovation grants and programmes
	Accelerate Estonia	Incubator Hub
	Tehnopol	Incubator Hub
	X-Road	Open-Source Software and ecosystem solutions
Netherlands	The Globaliser	Scale-up coaching for start-ups
	Vectrix	Innovation and R&D grants
	EIT Digital Venture Program	Incubator Hub
	Masters of Scale International Breakthrough Scaling	Scale-up coaching for start-ups
	GoGlobal	Scale-up coaching for start-ups
	Start-up in Residence	Start-up development programmes
Spain	GovTechlab Madrid	Incubator Hub
	Innovación GovTech	Workshop on building GovTech ecosystems
France	Standards set by the Open Government Partnership	Framework
	catalogue.nuerique.gouv.fr	Organized catalogue of state support services for start-ups
Austria	TOOP	Project

One of the primary focus areas of these programmes is *Regulatory and Legal Navigation*, which involves navigating different regulatory and legal environments and ensuring compliance with data protection laws. As GovTech solutions expand across borders, understanding and adhering to diverse legal frameworks becomes essential. This includes managing the complexities of different national and local regulations, and aligning them with international standards to facilitate smoother implementation and operation of digital solutions.

Another key area is *Financial and Operational Management*. This encompasses dealing with financial constraints and high operational costs, as well as the risks associated with international expansion. The development and scaling costs of GovTech solutions can be significant, and careful financial planning and management are required to ensure sustainability and growth. Addressing these financial challenges is crucial for enabling the successful deployment and expansion of GovTech initiatives.

Trust Building and Security is also a critical focus area of these programmes. Trust is important for public sector organisations to ensure sound and sustainable business relationships. Thus, establishing trust and credibility with foreign government organisations and clients is vital for the adoption and success of GovTech solutions. This includes ensuring the security of sensitive data and information, which is paramount in maintaining the confidence of stakeholders. Robust security measures and transparent practices help in building trust and fostering long-term relationships.

Market Adaptation and Entry involves understanding and adapting to local market needs and preferences. Successful GovTech initiatives need to be able to tailor their solutions to fit the unique requirements of different markets. This includes both structural, as well as socio-organisational factors like establishing networks and a local presence in new markets, as well as building brand visibility and recognition. Adaptation to local contexts, as supported by many of these programmes, ensures that the solutions are relevant and effectively meet the needs of the users.

Technical Challenges and Innovation form another significant focus area of these programmes. This includes ensuring the compatibility and interoperability of tech solutions across borders and addressing customization needs due to, for example, varied data and security standards. Maintaining data integrity and reliability in different systems is crucial for the seamless functioning of GovTech solutions.

Furthermore, fostering collaborations and participation in global innovation networks can drive continuous improvement and innovation in GovTech.

These common focus areas highlight the multifaceted challenges and opportunities in the realm of cross-border GovTech. By addressing these areas, national programmes seek to enhance the development, implementation and scalability of their initiatives, ultimately contributing to the broader goal of digital transformation in the public sector.

Adding to the overview of national initiatives above, Table 2 lists diverse initiatives from the European Commission. They highlight the European Commission's commitment to creating a *unified digital framework* that facilitates seamless interaction and service delivery across national boundaries.

Table 2 Exemplary European GovTech Initiatives

Name of Initiative or Solution	Short Description and Originating entity(ies)	Function and Goal for the Public Sector
JoinUp	Open-source online platform	Sharing interoperability knowledge
Common Mapping of Innovation Supporting Actors	Data publication, exchange and visualization. Integrated data for websites.	Evidence-Based Decision Making
EBSI European Blockchain Services Infrastructure	Building a secure infrastructure that enables public services to operate more efficiently, transparent and cost-effective.	Make services trustworthy, validating credentials
NIFO National Interoperability Framework Observatory	Facilitating and monitoring interoperability and seamless cooperation between the different actors in the legislative process in and between EU Institutions and Member States.	Interoperability
LEOS	Using AI as a regulator establishing a legal framework for its use within society. Accelerating the role by supporting the adoption of AI to improve services.	Improve the quality of legislation
IPSG Integrated public service governance	Guidance and recommendations to public administrations developing and operating integrated public services on how to approach organizational and governance issues related to the development of such services (closely related to the IOA).	Improve public service
SPDX JoinUp Licensing Assistant	Features taxonomy for content analysis, compatibility, legal aspects.	Open licenses
ACROSS Toolbox	Providing information to understand and implement digital public cross-border services	Public administration management

Name of Initiative or Solution	Short Description and Originating entity(ies)	Function and Goal for the Public Sector
ETAPAS	Improve public service delivery for citizens by facilitating the ethical adoption of disruptive technologies.	Improve public service
EULF Blueprint/ELISE action	Use of location info in public services and policies.	Location interoperability enhancement
TESTA	Secure network for cross-border information exchanges between EU/Member States. EC DIGIT	Facilitating confidential communications
eGovEra	Set of tools such as reference architectures, survey, quadrant and roadmap for analysis of the capabilities of digital business.	Enhancing digital capabilities
The Token platform	Developer-friendly set of plug-and-play services and open-source components for building decentralized apps and services.	Formal data model to express impacts of legislation acts.
Application Programming Interfaces (APIs) for the digital transformation	Framework for strategic enhancements across policy, platforms, people and processes.	Assess and improve API infrastructure

When reviewing the current GovTech landscape, the relative absence of systematic monitoring of national initiatives and practices becomes apparent. Article 20 of the IOP Act addresses some aspects of GovTech monitoring but serves purely as a starting point. Without more in-depth monitoring, it is challenging to identify and propagate best practices effectively. Establishing mechanisms for regular review and assessment of GovTech initiatives is essential for continuous improvement and for scaling successful models across different regions. Identifying such monitoring mechanisms and indicators would need further theoretical background considerations, but would provide immense value for both policy makers and GovTech founders considering best- and worst-practices.

2.2 Theoretical Background

To effectively address the multifaceted challenges and opportunities in the realm of cross-border GovTech initiatives, we commenced by describing several common focus areas. These focus areas were derived from a comprehensive review of national GovTech initiatives and are pivotal for the successful implementation and scalability of GovTech solutions. The identified focus areas include regulatory and legal navigation, financial and operational management, trust building and security, market adaptation and entry and technical challenges and innovation (see Section 2.1 for detailed explanations).

Subsequent to our extensive review, it became evident that a structured framework was necessary to systematically address the challenges and leverage the opportunities inherent in these focus areas. This insight led us to adopt the Entrepreneurial Ecosystem Framework as proposed by (Isenberg, 2016b). The Isenberg framework offers a robust and comprehensive approach to understanding and enhancing the entrepreneurial environment that is essential for the success of GovTech initiatives. The framework encompasses a holistic perspective that includes critical elements such as policy, finance, culture, supports, human capital and markets, all of which are indispensable for addressing the identified focus areas effectively. The framework defines six main thematic clusters, as visible in Figure 2:

Culture: A supportive entrepreneurial culture is essential, and should be characterized by societal norms and values that encourage risk-taking, innovation and the acceptance of failure as part of the learning process.

Support: Various support structures and models such as incubators, accelerators, mentoring networks and entrepreneurial education programmes are vital for providing the necessary guidance and resources to entrepreneurs.

Human Capital: Access to skilled and educated stakeholders is crucial for fostering innovation and entrepreneurial activity. This involve not only founders but also employees who can drive the business forward.

Markets: Entrepreneurs need access to sufficient and accessible markets for their products and services. This includes local, regional and international markets that can provide diverse opportunities for growth. In our case, the public market is in a peculiar position, as it is potentially monopolistic through politically set legal frameworks, e.g. nation-wide central procurement practices, while being characterised by very different organisational and legal structures at multi-governance levels.

Finance: Adequate access to financial resources, such as venture capital, loans and grants, is critical for starting and scaling businesses. Financial support and seed capital to enterprises helps in navigating the initial stages of business development and in sustaining its growth.

Policy: Supportive entrepreneurial policies and a favourable regulatory environment are fundamental. This includes not only the creation of business-friendly laws and regulations but also active government programmes that encourage entrepreneurial activities.

Figure 2 Entrepreneurial Ecosystem Framework (adapted from Isenberg, 2016)
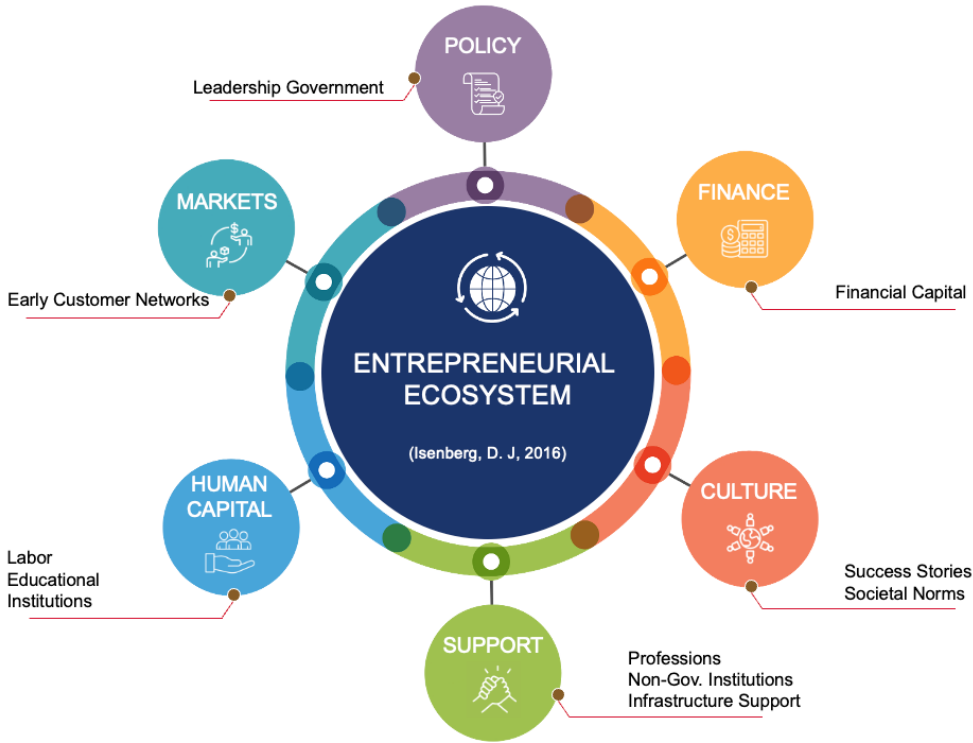
The transition of our initial focus areas (see Section 2.1) into the Isenberg Entrepreneurial Ecosystem framework followed a logical and methodical approach. Each of the identified focus areas – regulatory and legal navigation, financial and operational management, trust building and security, market adaptation and entry and technical challenges and innovation – was associated with one of the six components of Isenberg's model. Following such approach, we were able to combine rich and specific insights into cross-border GovTech in Europe (through the lens of GovTech programmes) with a sound theory-based and more general framework.

2.3 Empirical Reflexions

In order to ensure that our study's framework accurately reflects the realities of cross-border GovTech initiatives, we took in qualitative interview data (see Section 3 for details). The interviews were designed to shed light on the various factors influencing the success and challenges of GovTech practices and their implementations. With the help of these empirical insights, the framework development went into an ongoing *cycle of reflection and refinement.* After every ten empirical interviews with European GovTech founders (about ten iterations were conducted), the insights were used to develop and enrich the existing framework categories.

Such *iterative process* allowed for a dynamic adaptation, ensuring the framework is effective and specific in identifying key factors affecting GovTech practices. By means of this approach, we were able to achieve theoretical saturation and to enrich the under-developed aspects.

2.4 Validated Framework

The adapted entrepreneurial ecosystem framework was subjected to a rigorous validation process during two workshops, jointly organized by the Joint Research Centre and DIGIT of the European Commission (in January and in May 2024. The workshops gathered experts from various domains including policymakers, technologists and GovTech practitioners to assess critically the framework's effectiveness in capturing the complexities of GovTech ecosystems across European borders.

The proceedings from the workshops provided a structured springboard for presenting the results of the framework's application. During the workshops, participants reviewed selected empirical data and provided feedback on the framework's categories and their relevance to the public sector GovTech initiatives. This collaborative discussion was crucial for identifying any gaps or misalignments within the analytical framework.

Based on the insights gained during the workshops, it became apparent that a deviation from our original model was necessary to reflect the unique GovTech context more accurately, especially about cross-border practices. Isenberg's framework traditionally treats all categories as equally affecting an entrepreneurial ecosystem. However, our findings suggested that a different configuration was needed, including its determining factors, when the public sector operates cross-border.

In the revised framework configuration, Policy was identified as taking an all-encompassing position, underscoring its predominant influence over all other categories in the public sector's GovTech ecosystem, see Figure 3. This deviation acknowledges the central role that policy plays in shaping the environment and the dynamics of its actors in which technology solutions are developed and implemented across borders.

Technology: Digital technologies play a significant role in shaping entrepreneurial ecosystems by enabling new forms of ventures and innovations. The integration of technology enhances the entire entrepreneurial process, making ecosystems more dynamic and adaptable to changes, especially with them being process and product.

This additional crosscutting dimension of technology was introduced in our model (see Figure 3), as interoperability is crucial for facilitating the exchange of information and resources, by enhancing the overall functionality and efficiency of the entrepreneurial ecosystem. The ability to integrate and operate seamlessly is especially important in digital entrepreneurial ecosystems, where multiple platforms and digital services need to interact without friction. This is even more crucial when operating and interacting cross-border.

Figure 3 Validated Analytical Framework
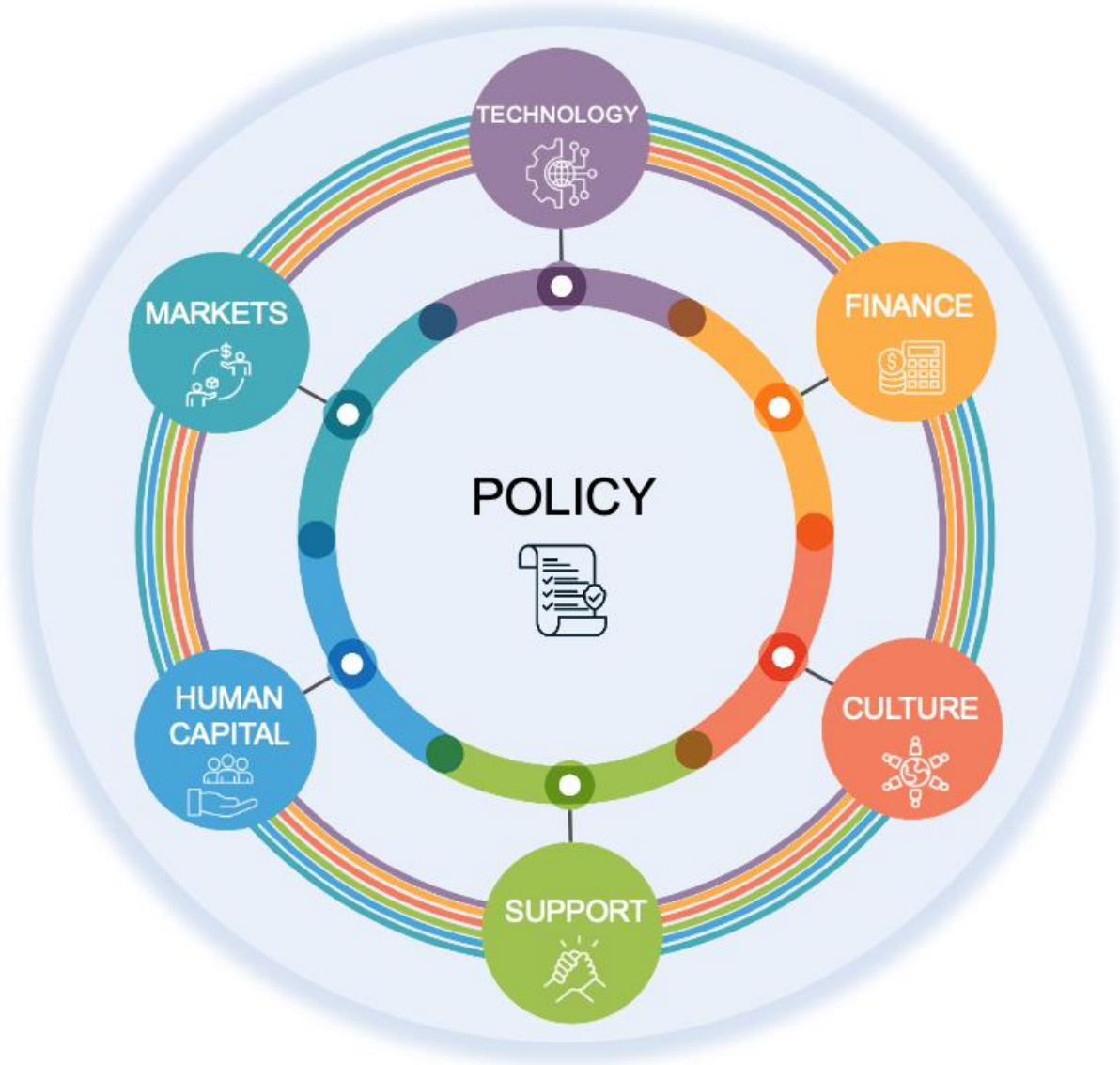
3 Method and Sampling

3.1 Method Selection

In order to shed light on the factors influencing cross-border GovTech practices in Europe and to answer our research question, we employed a methodological approach that combined a GovTech program review, theory-driven analysis and empirical reflections derived from expert interviews and expert workshops (Johnson & Onwuegbuzie, 2004). While the iterative development of our specific theoretical framework was laid out above (see Section 2), the following Section details the empirical process. Here, expert interviews were selected as the primary empirical method for this study due to their effectiveness in capturing rich, context-specific insights that are not easily obtainable through quantitative methods. The complexity and variability inherent to cross-border GovTech practices call for a qualitative approach that allows for in-depth exploration of individual experiences and perspectives (Myers, 1997).

Expert interviews provide several key advantages in this context (Döringer, 2021; Kaiser, 2021). Firstly, expert interviews facilitate a deep understanding of the specific contexts within which GovTech solutions operate. Given the diversity of regulatory, cultural and operational environments across EU Member States, capturing the nuanced perspectives of experts who are actively engaged in these ecosystems is crucial. These interviews allow for the elicitation of detailed information on how local conditions influence the implementation and scalability of GovTech solutions.

Secondly, the open-ended nature of interviews enables experts to articulate their experiences and insights comprehensively. This approach generates rich, qualitative data that can reveal underlying factors, motivations and barriers that quantitative methods might overlook. Such depth is essential for understanding the multifaceted challenges and opportunities in cross-border GovTech initiatives.

Thirdly, the iterative nature of conducting and analyzing expert interviews allows for ongoing adaptation of the research framework. After every ten interviews, we conducted validation checks to refine our understanding and adjust our theoretical framework based on real-world inputs. This dynamic process ensures that the framework remains relevant and accurately reflects the complexities encountered by GovTech practitioners.

Lastly, by cross-referencing the insights obtained from interviews with existing literature and program reviews, we can triangulate data to strengthen the validity and reliability of our conclusions. This method also helps identify any discrepancies or gaps in the existing body of knowledge, thereby informing more robust policy recommendations.

Prior to conducting these interviews, an interview guideline was developed based on the latest version of the theoretical analytical framework. The starting points were the results of reviewing GovTech program (see Section 2.1) combined with Isenberg's framework (see Section 2.2). Such approach ensured that our questions were aligned with the components of the Isenberg Entrepreneurial Ecosystem framework and covered various aspects of cross-border GovTech practices, including regulatory and legal navigation, financial and operational management, trust building and security, market adaptation and entry and technical challenges and innovation.

To validate these study's findings further, the JRC together with DIGIT of the European Commission jointly organized two workshops with experts from various domains, including policymakers, technologists and GovTech practitioners. These workshops provided a springboard for critical

assessment of our framework and facilitated the identification of any gaps or areas requiring adjustment. By employing expert interviews, we were able to capture a rich tapestry of context-specific knowledge that is essential for understanding the dynamics of cross-border GovTech practices. This method, combined with a robust analytical framework, ensures that our findings are both grounded in real-world experiences and theoretically sound, ultimately contributing to the development of effective policy, regulatory and operational adaptations that support the growth and integration of GovTech solutions across Europe.

3.2   Sampling

In line with the study objectives, we focused on contacting GovTech entrepreneurs across Europe who were identified through their involvement in both national and European GovTech initiatives. Our sampling strategy aimed to cover a diverse set of experiences and perspectives to ensure the robustness of findings.

We employed a targeted outreach approach, utilizing LinkedIn and email as the primary modes of communication. A total of 402 GovTech founders were contacted through these digital platforms. Out of these, 111 founders agreed to participate in our study, resulting in a conversion rate of approximately 27%. Such substantial response rate reflects the willingness of the European GovTech community to engage in discussions about their experiences and challenges, underlining the relevance of our research to their work.

The founders participating in the interviews represent a broad spectrum of the GovTech landscape, thereby contributing to the depth and diversity of the qualitative data collected. We successfully reached GovTech founders in 18 European countries, of which 15 are EU Member States (see Figure 4). This geographical diversity provided a wide-ranging view of the different regulatory, cultural and operational environments in which GovTech solutions are being developed and implemented.

By securing participation from a varied cross-section of the GovTech community, we were able to ensure that the insights gathered were comprehensive and reflective of the broader European context. This diversity is crucial to understand the multifaceted challenges and opportunities associated with cross-border GovTech practices, and to formulate robust, evidence-based policy recommendations.

Figure 4 Country Samples from Interviews

3.3 Sample Demographics

Understanding the demographics of our sample is crucial for contextualizing the study's findings. This information is essential for ensuring that the data collected is representative of the broader GovTech landscape in Europe. By analysing the demographic composition of our sample, we can assess the extent to which our findings may be generalized to the wider population of GovTech founders and companies.

Founding Years. The founding years of the GovTech companies in our sample span from 2011 to 2024, providing a comprehensive view of the sector's evolution over the past decade. This temporal distribution, illustrated in Figure 5, highlights several key trends in the growth and development of GovTech enterprises across Europe.

Our data shows that the majority of GovTech companies in our sample were established in recent years, particularly from 2018 onwards. The number of new GovTech start-ups has seen a marked increase, with notable peaks in 2020 and 2021, where 17 and 18 companies were founded, respectively. This surge in new ventures correlates with the increasing emphasis on digital transformation and technological innovation in public services during this period. Conversely, the earlier years, such as 2011 and 2013, saw minimal activity with only one company out of our sample being started in each of those years.

This pattern (see Figure 5) suggests that the GovTech sector has gained significant momentum recently, reflecting a growing recognition of the importance of digital solutions in enhancing government operations and public service delivery. The rather low number of GovTech companies in our sample that were started 2023 and after may be explained through GovTechs (often) having to first establish themselves in their home market before looking into transnational expansion.

Figure 5 GovTech Founding Timeline Evolution
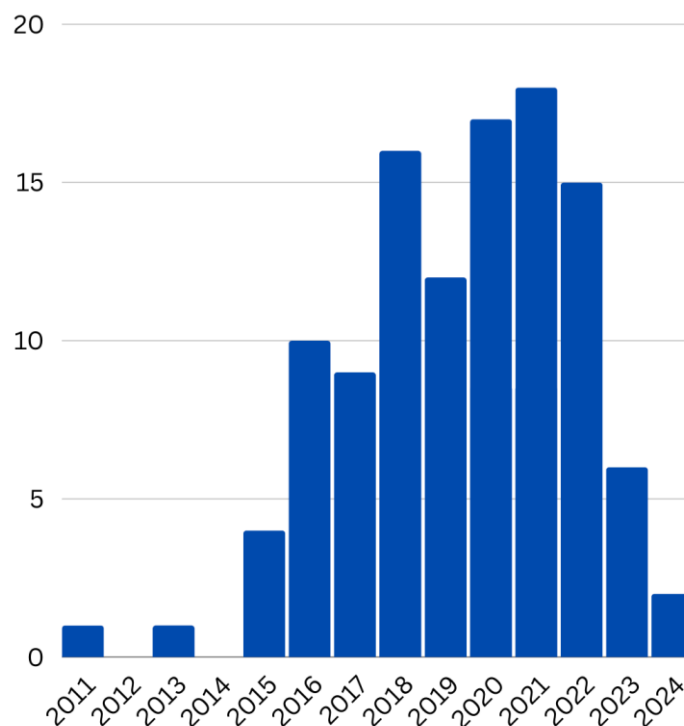
Diversity. The gender distribution of the GovTech founders in our sample reveals a significant disparity, with 96 male founders and only 15 female founders (in case there were more than one founder of a particular GovTech company, we only counted the one founder/person we interviewed). This aligns well with European entrepreneurs being 83% male and 17% female[2].

This imbalance, as illustrated in Figure 6, highlights the ongoing gender gap within the GovTech sector, reflecting broader trends observed in the technology and entrepreneurial ecosystems.

The underrepresentation of women in GovTech underscores the need for targeted initiatives to promote gender diversity and inclusion within the industry, as addressed in the digital skills cardinal points of the digital compass targets in the Digital Decade outline.

Encouraging more female participation in GovTech can bring diverse perspectives and innovative solutions to the challenges faced by public sector technology. Addressing this gender disparity is crucial for fostering a more inclusive and equitable environment that supports the growth and success of all entrepreneurs in the GovTech space.

Figure 6 GovTech Founders Gender Demographic (n=111)

[2] http://startupmonitor.eu/EU-Startup-Monitor-2018-Report-WEB.pdf

Standards. The interviewed GovTech entrepreneurs identified several key policies and standards that are relevant to their operations, highlighting the regulatory frameworks that influence their work. A part from the top 5 policies and standards mentioned, 42 founders (out of 111) indicated that they do not follow any specific named policies or standards. This number, as illustrated in Figure 7, suggests a *potential gap in regulatory guidance or awareness within the GovTech sector*, emphasizing the need for clearer, more accessible information on applicable policies and standards. It serves as a reminder, that a strong legal framework, not properly communicated to the parties concerned, will fall behind potential impact. A need for public or private support initiatives or institutions is evident.

For those who adhere to specific policies, national standards were the most commonly cited, with 21 founders (out of 111) highlighting their importance over European ones. This indicates that while cross-border initiatives are crucial, *national regulations still play a dominant role in shaping GovTech practices*, often caused by a strong need to prioritize national market share before looking into transnational expansion.

The EU's AI Act and the IOP Act were also prominently mentioned, with 14 and 10 founders respectively (out of 111) acknowledging their relevance. These regulations are critical for ensuring the ethical and seamless integration of technologies and enhancing interoperability between different systems.

Additionally, the Digital Services Act was noted by nine founders (out of 111), reflecting its impact on governing digital services and platforms. The emphasis on these EU-wide policies serves as a warning that care may be needed to ensure that regulations and relevant legal acts work in coherent ways to ensure new barriers of any nature (e.g. technological legal, administrative, financial, etc.) are not created that would affect on GovTech practices and on innovation in general.

Figure 7 Relevance of Standards/Policy for GovTech companies operations (total numbers, n=111)
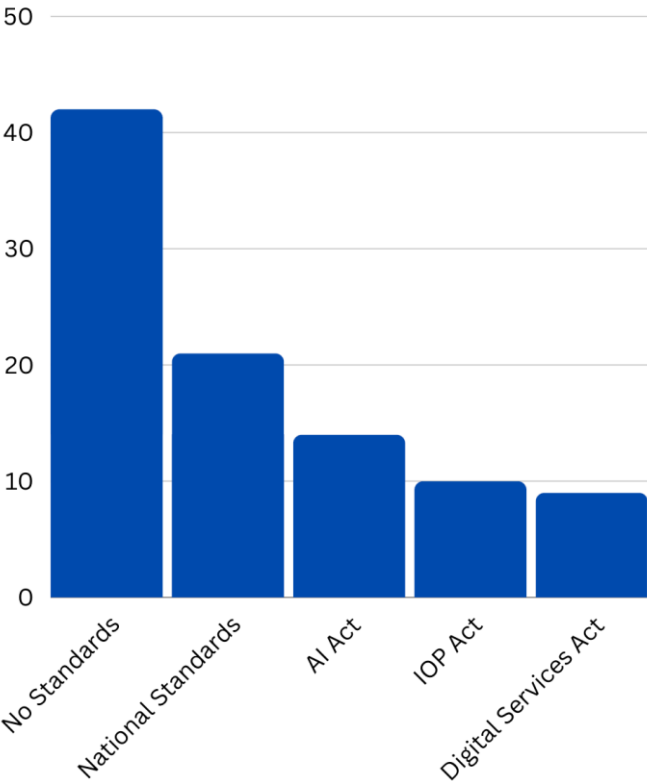
Infrastructure. The distribution of hosting infrastructures and cloud providers among the GovTech companies in our sample reveals a diverse landscape with various preferences and considerations. The most common choice for hosting infrastructure is on premise solutions, used by 17.7% of all respondents. This preference indicates a significant portion of large *GovTech companies prioritize control, security and customization capabilities* that on premise setups offer, despite the higher costs and maintenance efforts involved, whereas *smaller ventures approach infrastructure pragmatically and are often cloud agonistic or choose convenient pricing models*.

Among cloud providers, Google Cloud is the most popular, chosen by 16.7% of the companies. Amazon Web Services (AWS) closely follow this at 15.6% and Microsoft Azure at 11.5%. These leading cloud providers are favoured for their robust infrastructure, extensive service offerings and scalability, which are crucial for the dynamic needs of some GovTech solutions.

Additionally, a notable 12.5% of the companies adopt a cloud-agnostic approach, utilizing multiple cloud services to avoid vendor lock-in and increase flexibility.

Other providers such as Hetzner (9.3%) and IONOS (8.3%), along with various other smaller providers (8.3%), also contribute to the diverse hosting landscape, demonstrating the *varied requirements and strategic choices* of GovTech companies across Europe (see in Figure 8).

Figure 8 Distribution of hosting infrastructures and cloud providers among GovTech interviewed companies

28
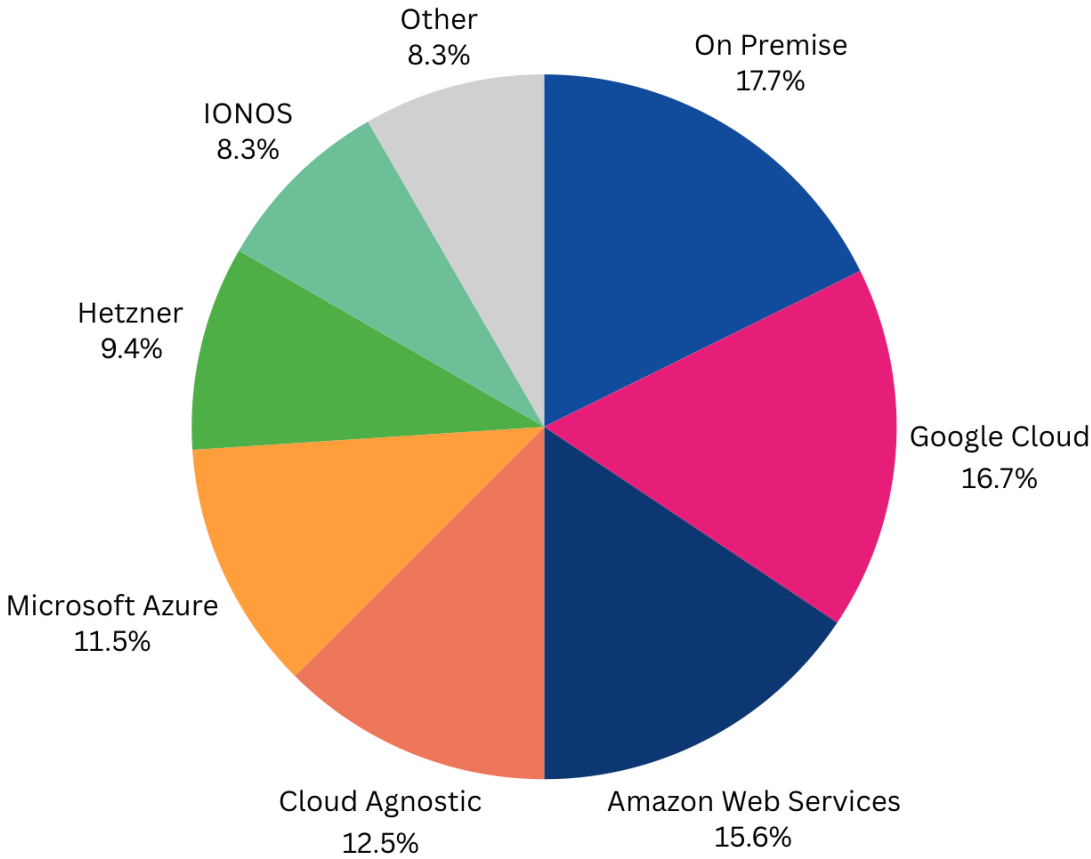
Open Source. The diverse approaches to open source among GovTech companies, as shown in Figure 9, underscore the varying strategies and philosophies within the sector, each with its own set of advantages and challenges.

Figure 9 Open Source Code provision by GovTech companies
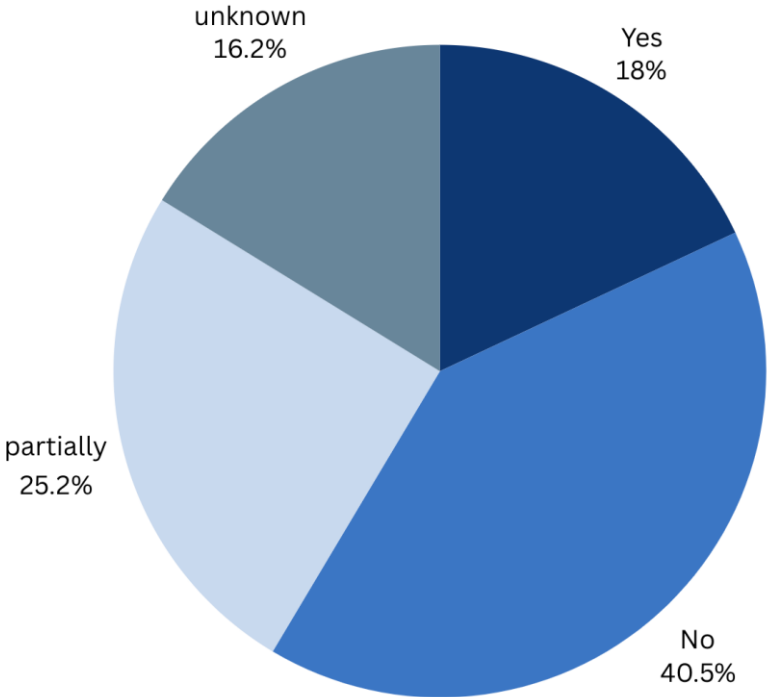
The adoption of open-source solutions among GovTech companies reveals a *mixed approach* towards transparency and collaborative development. According to our data, 25.2% of GovTech companies provide open-source solutions partially. This indicates a strategic approach where companies might make open-source certain components or tools, while keeping other parts as proprietary. Such a hybrid approach can balance the benefits of open-source - such as community contributions, increased transparency and reduced costs - with the need to maintain competitive advantages and control over core technologies.

A significant 40.5% of the GovTech companies do not provide open-source solutions at all. This majority highlights a preference for proprietary systems, which may be driven by concerns over security, intellectual property and commercial interests. However, the closed nature of these systems can limit collaboration, subsequent use opportunities and innovation that often arise from open-source communities.

Interestingly, 18% of the companies fully embrace open-source practices, offering their solutions under open-source licenses. This commitment to open-source reflects a dedication to transparency, collaboration and the public good - core values that align well with the objectives of GovTech.

Additionally, 16.2% of the companies did not declare their open-source practices, suggesting a need for more clarity or transparency in their operational disclosures.

4 Results

The results presented in this section are derived from a combination of 111 interviews with the respective GovTech entrepreneurs, and 2 workshops co-organised by the JRC and DIGIT of the European Commission including international experts in GovTech ecosystem, practitioners from public administrations and policy makers. The findings from both activities provided comprehensive insights into the factors that influence cross-border practices. All findings were clustered under the seven categories identified in the analytical framework (see Section 2.4).

4.1 Policy, regulations and context related framework-conditions

Policy is a fundamental pillar that shapes the environment in which GovTech companies and public administrations operate, particularly in the context of cross-border practices across the EU. Effective policy frameworks can facilitate innovation, ensure compliance with regulations and promote the scalability of GovTech solutions across different countries. However, inconsistencies and fragmentation in policies across various regions pose significant challenges to the seamless operation of GovTech companies. These challenges are magnified when firms attempt to implement solutions across multiple operational and multi-level governance systems and jurisdictions, where differing regulatory environments can hinder the scalability and effectiveness of their offerings. Therefore, harmonizing regulations and creating more transparent and supportive national and local policy landscapes is crucial for fostering thriving GovTech ecosystems within the EU.

Key Findings

- *Regulatory Fragmentation:* Despite the existence of EU-wide regulations, individual countries and even individual municipalities may impose additional, varied requirements. Such complexity hinders the scalability of GovTech solutions. In fact, GovTech companies face challenges navigating different regulatory landscapes, thereby leading to delays and increased costs. The lack of uniformity in legislation across countries, and the additional local regulatory requirements extending beyond the standards set by the EU, exacerbates these challenges.

- *Compliance with Data Protection Laws:* Although the EU GDPR provides a unified framework, its interpretation and enforcement varies, across and within countries making it difficult for GovTech companies and public administrations to ensure compliance across multiple jurisdictions. Moreover, the perceived non-transparency of national institutions responsible for GDPR standards and enforcement further create uncertainty and complicates compliance efforts.

- *Implementation of Existing Standards:* Current EU standards often lack consistency in their implementation. For example, the Ultimate Beneficial Owners (UBO) API, which is crucial for transparency, is not uniformly applied across the EU. This lack of consistent implementation hinders the effective use of GovTech solutions designed to increase transparency and accountability.

- *Language Barriers:* There is a significant lack of legal and operational guidelines to support procurement processes available in English, making it difficult for GovTech companies trying to operate across multiple EU countries. This issue complicates the understanding of local regulations and procurement processes and related compliance requirements.

- *Open Source and Interoperability:* There is a notable lack of understanding amongst policy makers and consequent support to open-source solutions and interoperability standards. This gap limits the adoption and integration of innovative GovTech solutions that rely on open-source technologies and seamless data sharing between systems.

Recommendations

In the light of the above challenges, the following recommendations are put forward:

1. *Harmonise Regulations:* Establish a unified regulatory environment through EU standard requirements that would satisfy the needs of GovTech companies to operate without adding additional layers of national requirements, would streamline compliance processes, reduce costs and encourage more GovTech companies to scale across borders. Inhibiting the implementation of stricter national standards than those set by EU regulations can lead to the needed harmonisation.

2. *Create a GDPR Certification for GovTechs:* Introduce an EU-level certification to validate GDPR compliance, reducing the need for multiple proofs of compliance. This would build trust in public administrations, simplify the legal navigation, and reduce resource consumption for GovTech start-ups. A certifying GDPR institution at the EU level dedicated to GovTech companies would ensure consistency and reliability in compliance validation.

3. *Promote Implementation of Standards:* Make the implementation of crucial standards like the UBO API mandatory, together with monitoring and publicly accessible documentation. This would ensure that transparency and accountability measures are uniformly applied, enhancing the effectiveness and interoperability of GovTech solutions.

4. *Repository of National Legal/Procurement Documents:* Create either a centralised or a network of national dedicated repositories where legal and operations guidelines of procurement processes are made available in English. This repository(ies) would facilitate easier access to the necessary documentation, helping GovTech companies to understand and comply with various local regulations and procurement processes in different languages.

5. *Promote Expertise in Open Source and Interoperability requirements:* Encourage the development of awareness and expertise amongst policy makers to support open-source solutions and interoperability standards. This can be achieved through targeted training programmes and awareness campaigns, promoting the understanding of the benefits of open-source technologies and seamless data sharing for the public sector. This expertise is crucial for fostering an environment conducive to the adoption of innovative GovTech solutions.

4.2 Access to Finance and market opportunities

Access to Finance is crucial for GovTech companies, as financial constraints and the need for substantial investment can significantly influence on their ability to develop and scale innovative solutions, and their entry into international markets. Access to seed funding, market validation and sound financial management are essential for sustaining operations and facilitating cross-border expansion. In the context of cross-border practices across the EU, financial challenges are further magnified by the need to navigate different funding environments and regulatory frameworks.

Addressing these financial and market barriers is crucial for fostering a thriving and interconnected GovTech ecosystem in Europe.

Key Findings

- *High Development and Scaling Costs:* The financial and human resources burden of developing and scaling GovTech solutions is significant, often requiring substantial upfront investment. Many GovTech companies rely on public funding, which is not always readily available. Additionally, the costs associated with multiple customisation and compliance can be prohibitive. Pilots and Proofs of Concept (PoCs) necessitate significant upfront investments, further straining financial resources. The limited budgets dedicated to procurement in the public sector and the financial constraints of start-ups exacerbate these challenges.

- *Reliance on Public Funding:* GovTech companies sometimes depend too much on public funding to sustain their operations and drive innovation – at least in some stages of their growth. However, the availability of such funding can be inconsistent and create unnecessary competitiveness, amongst the many start-ups struggling to secure the necessary financial support. The dependency on public funds also means that any changes in government budgets or priorities can significantly affect GovTech projects.

- *Limited Access to international Market Funding:* Securing financial support outside the home market is challenging, thereby hindering cross-border expansion. GovTech companies often struggle to meet the different funding criteria and processes in other EU countries, which limits their growth potential. Additionally, there is a possible loss of former (home market) clients due to the focus on expanding into new markets, which can create additional financial instability.

- *Lack of Strategic Cooperation:* Strategic Cooperation amongst domestic and international public administrations that would provide essential support and resources, thereby helping GovTech companies delve with financial constraints and expand into new markets, is very limited.

Policy Recommendations

1. *Simplify Application for Funding:* Reduce the complexity of applying for funding in non-home markets to facilitate easier access to financial resources. Streamlining funding processes would encourage more GovTech companies to expand across borders and participate in international projects. This includes the removal of barriers to participation in tenders in non-domestic markets.

2. *Incentivise Standardised Solutions:* Promote the adoption of Software as a Service (SaaS) models over customised solutions to reduce costs. Encouraging standardised solutions or Minimum Requirements Protocols can lower development costs and make GovTech products more scalable and sustainable. Dedicated platforms like the Public Sector Tech Watch observatory can help reduce the needs for customisation by supporting proper market analysis.

3. *Promote the Funding of Scaling Programmes:* Promote the development and funding of programmes specifically designed to support the scaling of GovTech start-ups that create public value. This could include tax exemptions and other financial incentives to help start-ups enter new markets. A dedicated fund for the acquisition of European GovTech solutions

would also support the growth and integration of innovative technologies in the public sector across the EU.

4. *Promote Strategic Partnerships:* Foster strategic partnerships between home market public institutions and international companies to mitigate financial constraints. These partnerships can provide essential support and resources, facilitating the development and scaling of GovTech solutions cross-border.

5. *Promote an EU Fund for European Innovation Acquisition:* Establish an EU dedicated fund for the acquisition of European GovTech solutions. This fund would on the one hand help scale promising GovTech start-ups and integrate their solutions across different EU markets, and on the other hand, foster a more interconnected and efficient public sector technology landscape based on European genuine innovation.

4.3 Cultural background

Culture plays a pivotal role in the acceptance and integration of GovTech solutions, especially in the context of cross-border practices across the EU. Building trust, overcoming resistance to change and fostering a culture of innovation within public administrations are essential for the successful adoption of new technologies. Cultural factors, including language and communication barriers, institutional designs and local procurement preferences, can either facilitate or hinder the growth of GovTech companies. Addressing cultural challenges is crucial for promoting a unified and innovative GovTech landscape in Europe.

Key Findings

- *Trust and Credibility Issues:* Foreign GovTech companies often face scepticism from local public administrations regarding their trustworthiness, soundness and longevity. Building credibility in new markets is a significant hurdle, as public administrations often prefer local providers they are more familiar with. Uncertified forms of credibility and the need for GovTech companies to establish regional or local offices to represent them to gain trust compound this issue.

- *Resistance to Change:* Public administrations are often resistant to adopting new technologies, preferring to stick to traditional processes and vendors. This cultural resistance to change can slow down the adoption of innovative GovTech solutions, hindering progress and efficiency. Participation in dedicated innovation events, open-source and expertise groups, such as climate councils, can help mitigate this resistance by demonstrating the value and reliability of new technologies.

- *Language and Communication Barriers:* Language differences and communication challenges can impede the effective collaboration and integration of GovTech solutions across different EU countries. These barriers can result in misunderstandings, reduced efficiency and reluctance to adopt foreign technologies.

- *Institutional Design Isomorphism:* The similarity or difference in institutional designs between countries can either enable or hinder the adoption of GovTech solutions. Countries with similar institutional frameworks are more likely to adopt each other's solutions, while significant differences can create barriers.

- *Local/National Procurement Preferences: Preferential practices* in local and national procurement processes can restrict opportunities for foreign GovTech companies. This issue can extend to export preferences, where local administrations favour domestic companies, thereby impeding the entry of foreign GovTech solutions.

Policy Recommendations

1. *Promote GovTech Certification practices:* Develop a certification process to enhance the credibility of GovTech companies across Europe. A widely recognized certification can help build trust with public administrations cross-border and ease the entry of foreign GovTechs into new markets. The implementation of a GovTech (credibility) certificate would standardise trust measures and reduce scepticism towards foreign companies.

2. *Promote Cultural Exchange Programmes:* Encourage exchanges between young and old employees in public administrations to foster a culture of innovation and acceptance of new technologies. Cultural exchange programmes can help bridge the gap between traditional practices and innovative solutions, promoting a more open-minded approach within public administrations.

3. *Implementation of National **"Anchor Offices"**:* Promote regional and local offices to represent GovTech companies as national "anchor places" to foster European GovTech cross-border localisation. These anchor places would serve as hubs for GovTech companies to establish a local presence, facilitating trust-building and cultural integration with public administrations.

4. *Promote Active Participation in Expert Groups:* Actively invite GovTech companies to participate in European expert groups, such as the Expert Group on Urban Mobility. Inclusion in these groups would provide GovTech companies with opportunities to demonstrate their expertise, to build credibility and to be part of the policy development within the EU.

5. *Development of Matching Programmes:* Promote and develop cross-border matching programmes where local administrations seek innovative GovTech solutions. These programmes would help local administrations to identify and adopt suitable technologies from across Europe, fostering collaboration and innovation.

6. *Promote Fair Competition:* Incentivise legislation aimed at preventing local and national procurement processes from favouring domestic companies over foreign ones. Such legislation would promote a more open and competitive market for GovTech solutions across the EU, ensuring equal opportunities for all participants.

7. *Foster Cultural Exchange and Integration Initiatives:* Allocate funds to support cultural integration initiatives, such as language training and communication workshops, to address language and communication barriers dedicated to procurement processes. These initiatives would facilitate better collaboration and understanding between GovTech companies and public administrations.

4.4 Support Framework infrastructure

Support infrastructure is crucial for the success of GovTech companies, providing them with the necessary resources, networks of practitioners and guidance to navigate complex markets. This is especially important for cross-border practices across the EU, where differing regulations, standards

and market conditions can pose significant challenges. Adequate support can significantly enhance the ability of GovTechs to secure contracts, collaborate effectively and scale their operations across multiple countries. A robust support framework is essential for fostering a cohesive and innovative GovTech ecosystem throughout Europe.

Key Findings

- *Lack of Supporting Infrastructure:* GovTech start-ups often lack access to essential support structures, such as legal, financial and networking services. Without adequate support, start-ups struggle to navigate the complexities of entering new markets and securing government contracts. This is particularly challenging when dealing with large governmental institutions, and navigating different vendor standards and local requirements.

- *Need for Networking Platforms:* There is a significant demand for platforms that facilitate networking and collaboration among GovTech companies and public administrations. Effective networking can help GovTechs identify opportunities, share best practices and form strategic partnerships. Reliance on external networks and partnerships is crucial for market entry, highlighting the need for more structured and accessible networking avenues.

- *Challenges in Working with Large Governmental Institutions:* GovTech companies often face difficulties when working with large governmental institutions due to bureaucratic complexities and rigid procurement processes. These challenges can impede the ability of GovTechs to secure and manage contracts effectively.

- *Lack of Marketplaces for Trans-National Solutions:* There is a notable absence of marketplaces that support the promotion and adoption of trans-national GovTech solutions. This gap limits the visibility and scalability of innovative solutions across different EU countries.

Policy Recommendations

1. *Create Support frameworks and Dedicated Institutions:* Establish institutions specifically designed to support GovTech start-ups with legal, financial and networking services. Providing dedicated support can help GovTech companies overcome initial barriers and scale more effectively. These institutions could also offer guidance on navigating different vendor standards and local requirements.

2. *Implement Networking Platforms:* Develop and promote awareness raising platforms, to facilitate collaboration and information sharing. Networking platforms can enhance the visibility of GovTech solutions and create opportunities for partnerships and market entry. Such platforms should also include up-to-date information on regulations and established standards to assist companies in navigating different market requirements.

3. *Simplify Procurement Processes:* Simplify procurement processes to make it easier for GovTech companies to participate in government contracts across different EU countries. Streamlining these processes would reduce bureaucratic hurdles and make it more feasible for start-ups to secure and manage contracts with large governmental institutions.

4. *Harmonize the underlying IT Infrastructure in Europe:* Harmonize IT infrastructure across Europe to facilitate the integration and scalability of GovTech solutions. A unified IT infrastructure would reduce the complexity of implementing solutions in different countries and promote a seamless digital environment.

5. *Create Marketplaces for Trans-National Solutions:* Develop marketplaces that support the promotion and adoption of trans-national GovTech solutions. These marketplaces would provide a platform for GovTech companies to display their products and services, making it easier for public administrations to discover and implement innovative solutions from across the EU.

6. *Support Strategic Partnerships:* Encourage the formation of strategic partnerships between GovTech companies and key stakeholders in different countries. These partnerships can provide essential resources and support, helping start-ups navigate market entry and scale their operations more effectively.

7. *Establish reference Platform for Regulatory Information:* Create a central platform that provides up-to-date information on regulations and established standards across different EU countries. This platform would assist GovTech companies in understanding and complying with various market requirements, facilitating smoother cross-border operations.

4.5 Human Capital

Human capital is a vital component of the GovTech ecosystem, especially in the context of cross-border practices in the EU. The ability to attract, hire and retain skilled talent across borders is essential for innovation and growth. However, cross-border hiring and employment present significant challenges to the GovTech companies interviewed, due to differing regulations and administrative burdens. These challenges may impede the ability of GovTech companies to access a diverse talent pool and scale their operations effectively across multiple EU countries. Addressing these human capital barriers is crucial for fostering a dynamic and interconnected GovTech landscape throughout Europe.

Key Findings

- *Cross-Border Hiring Challenges:* GovTech companies face difficulties in hiring talent from different EU countries due to varying employment laws and regulations. The complexity of cross-border hiring processes, including the administrative burden of remote international employment and the challenge of navigating different hiring and employment laws and regulations, limits the ability of GovTechs to access a diverse talent pool and scale their operations. Additionally, without local entities, accessing talent across the EU becomes even more challenging.

- *Lack of IT Training for Public Officials:* Public officials often lack the necessary skills and training to effectively implement and manage GovTech solutions. This is part of a larger problem, the lack of client professionalization in public sector organisations when working with external parties/service providers. Without adequate training, the adoption and integration of new technologies are hindered, reducing the overall effectiveness of GovTech solutions. The lack of overview for recruiting international start up-interested talent further exacerbates these issues.

Policy Recommendations

1. *Harmonize cross-border employment Regulations*: Standardize employment laws across the EU to simplify the hiring process for GovTech companies. Harmonizing hiring regulations would enable GovTechs to more easily employ talent from different countries, enhancing their

ability to scale and innovate. This harmonization would also reduce the administrative burden associated with remote international employment.

2. *Invest in IT Training*: Provide comprehensive IT training programmes for public officials in order to improve their ability to manage and implement GovTech solutions (client professionalization). Training public officials in the latest technologies can facilitate smoother adoption and integration of GovTech solutions, improving overall efficiency. European workforce education for public sector technology should be a priority to ensure that public officials are well equipped to handle innovations.

3. *Promote Transnational Personnel Placement Agencies*: Establish a network of EU-wide agencies focused on IT skills to facilitate transnational subcontracting and personnel placement. These agencies would help GovTech companies find and hire skilled talent across borders, simplifying the recruitment process and ensuring a steady supply of qualified professionals.

4. *Create an EU-Wide Knowledge Platform for Hiring Abroad*: Develop a comprehensive platform that provides information on hiring across different EU countries, including local differences and processes. This knowledge platform would assist GovTech companies in navigating the complexities of cross-border hiring and ensure they are aware of all relevant regulations and procedures.

5. *Promote International Talent Recruitment:* Implement initiatives to attract international start up-interested talent to the GovTech sector. This could include targeted recruitment campaigns and partnerships with educational institutions to raise awareness about opportunities in GovTech across the EU.

4.6 Markets

Access to markets is critical for the growth and scalability of GovTech companies, particularly in the context of cross-border practices in the EU. Understanding local market needs, navigating procurement processes and establishing a presence in new markets are essential for success. However, market access challenges, including lack of access to decision-makers and visibility in procurement platforms, can significantly impede the growth potential of GovTech solutions. Addressing these challenges is crucial for fostering a competitive and integrated GovTech ecosystem in Europe.

Key Findings

- *Access to Decision-Makers:* GovTech companies often struggle to access key decision-makers within public administrations, hindering their ability to secure contracts and expand their market presence. Difficulty in identifying and reaching decision-makers slows down the procurement process and limits the growth of GovTech companies. Additionally, understanding governmental processes and building trust with public officials form significant barriers.

- *Visibility in Procurement Platforms:* Many GovTech companies lack visibility in government procurement platforms, making it difficult for them to highlight their solutions to potential clients. Without adequate visibility, GovTechs miss opportunities to engage with public administrations and secure contracts. The ease of access for public sector clients is also an issue, as many platforms are not user-friendly.

- *Demand for Proof of Concept (PoC) and Pilot Projects:* There is a high demand for PoCs and pilot projects by the different Public Administrations to demonstrate the viability of GovTech solutions. Market scepticism and the resources needed to demonstrate product viability could create significant hurdles for GovTech companies. Additionally, local companies often receive subsidies to overcome resources needs, which is a disadvantage for foreign GovTech firms.

- *Tedious Legal Systems:* Navigating the complex and varied legal systems across different EU countries can be a daunting task for GovTech companies. This complexity can delay market entry and create additional costs.

Policy Recommendations

1. *Enhance dedicated Procurement Directories:* Create comprehensive public procurement directories dedicated to digital solutions that are easily accessible to GovTech companies. Enhanced directories can improve the visibility of GovTech solutions addressing PAs needs and facilitate connections with potential clients in public administrations. The creation of reference public procurement directories of dedicated digital solutions would ensure that all relevant opportunities are available in a centralized location.

2. *Enforcement of Tender Translation:* Implement policies that enforce the translation of tenders, regardless of their value, in different languages, to ensure that language barriers do not prevent GovTech companies from accessing procurement opportunities. This will facilitate easier access to contracts for non-native speakers and promote a more inclusive market.

3. *Support the set-up of dedicated GovTech Showrooms: Promote the establishment of* GovTech showrooms across the EU where companies can demonstrate their solutions to public sector officials. These showrooms would provide a platform for GovTech companies to highlight their products and engage directly with decision-makers, thereby building trust and demonstrating product viability.

4. *Promote the creation of an EU-Wide Directory featuring PoCs:* Develop an EU-wide directory that includes proof of concept (PoC) projects for public administration. This directory would provide a centralized repository of successful PoC projects, helping GovTech companies build credibility and display their solutions' effectiveness.

5. *Inhibit Subsidy dedicated to a specific Nationality:* Enact legislation that prohibits the subsidization of companies based on nationality. This would ensure a level playing field for all GovTech companies regardless of their country of origin and promote fair competition in the market.

6. *Promote the creation of dedicated Legal Advisory bodies that* would provide legal advisory services to help GovTech companies navigate the complex legal systems of different EU countries. This support would reduce the barriers to market entry and help companies comply with local regulations more efficiently.

7. *Facilitate Event-Based Networking:* Promote the organisation of events that bring together GovTech companies and public sector officials across borders to promote networking and collaboration. Event-based networking can help GovTechs build relationships with decision-makers and increase their chances of securing contracts. These events should also focus on sharing best practices and successful case studies to build trust and display the impact of GovTech solutions.

4.7 Technology barriers

Technology is at the heart of GovTech solutions. The development, implementation and integration of innovative technologies are crucial for enhancing public services and achieving seamless interoperability between different national systems. However, technological challenges such as inconsistent data standards, interoperability issues and difficulties in integrating with local IT infrastructures can hinder the effective deployment of GovTech solutions. Addressing these technological barriers is essential for creating a cohesive and efficient GovTech ecosystem in Europe.

Key Findings

- *Inconsistent Data Standards and APIs:* The lack of uniform data standards and APIs across different regions poses significant challenges for GovTech companies. Diverse data standards and APIs make it difficult for GovTechs to ensure compatibility and interoperability of their solutions across borders. Balancing product customization with global standardization remains a critical issue.

- *Integration with Local IT Infrastructures:* GovTech companies often face difficulties integrating their solutions with the existing IT infrastructures of public administrations. These integration challenges can delay the deployment of GovTech solutions and reduce their effectiveness. Moreover, feedback-based development is hindered by incoherent Open Data and Open Source initiatives.

- *Existing Standards requiring stronger Implementation:* Existing standards, such as those for ultimate beneficial owners (UBO), often lack consistent implementation across the EU. This inconsistency can lead to inefficiencies and hinder the development of uniform GovTech solutions.

- *Diverse Data Management Practices:* Different data management practices across EU countries complicate data sharing and interoperability. GovTech solutions must often be tailored to fit these varied practices, increasing development time and costs.

- *Fragmented Open-Source Policies:* Inconsistent adoption and implementation of open-source policies across the EU can hinder collaboration and innovation. A unified approach to open-source standards would facilitate the sharing and improvement of GovTech solutions.

Policy Recommendations

1. *Standardize Data and APIs:* Develop and enforce uniform data standards and APIs across the EU to ensure compatibility and interoperability of GovTech solutions. Standardization can simplify the integration process and enhance the scalability of GovTech solutions. Creating uniform data standards and APIs will address the challenges posed by diverse regional practices and facilitate cross-border interoperability.

2. *Promote Open Data Initiatives:* Encourage the adoption of open data and open-source as criteria in public procurement to foster innovation and collaboration. Open data initiatives can enhance transparency and facilitate the development of innovative GovTech solutions. Implementing Open Data/Open-Source as procurement criteria (e.g., CC BY NC SA) will promote a more inclusive and collaborative technological environment.

3. *Strengthen GovTech Patenting:* Strengthen patenting processes for GovTech innovations to create a unique selling proposition (USP) for European solutions. This will encourage

innovation and protect intellectual property, ensuring that European GovTech solutions remain competitive on a global scale.

4. *Set up a Centralized Market Observatory:* Implement a centralized market observation system for public authorities to display the available GovTech solutions and prevent the replication. This system will ensure unique innovations to be recognized, and that efforts are not duplicated, fostering a more efficient market.

5. *Enhance the Implementation of Existing Standards:* Ensure the consistent implementation of existing standards, such as those for ultimate beneficial owners (UBO), across the EU. This will create a more uniform regulatory environment and reduce inefficiencies in the deployment of GovTech solutions.

6. *Facilitate Integration with Local IT Infrastructures:* Provide guidelines and resources for GovTech companies to facilitate the integration of their solutions with local IT infrastructures. This will reduce deployment delays and improve the overall effectiveness of GovTech solutions.

7. *Unify Open-Source Policies:* Implement a unified approach to open-source policies across the EU to facilitate collaboration and innovation. Standardized open-source practices will encourage the sharing and improvement of GovTech solutions, driving technological advancement across the region.

5 Summary and Conclusions

This study investigated *GovTech practices for the public sector acquisition of innovative digital technologies* focusing specifically on the engagement of start-ups and SMEs in the design, provision and management of procured innovative public services. While building on previous research in the area, this work focuses on the uptake of innovative digital solutions for the provision of public services specifically in cross-border and multilevel governance systems.

On this basis, the study identifies preferential procurement as being one of the main obstacles to the growth and spread of innovative public sector solutions beyond the national borders and even within the same Country. Based on the results of 111 GovTech interviews and 2 dedicated workshops with GovTech Experts, practitioners and policy makers, it became clear such preferential practices limit the expansion of GovTech companies across Europe. This issue is especially evident in the operations of national innovation agencies, which tend to favour exporting local GovTech solutions rather than importing foreign ones. As a result, GovTech is often used to support the local economy of Start-ups, rather than driving innovation and a true digital transformation of the public sector by benefitting from wider returns in terms of increase of human and technological resources.

Another significant problem lies in the varying of laws and regulations across EU countries in this area. Even with the existence of EU-wide regulations, individual countries, regions and municipalities need to refer to their own rules, making it hard for GovTech solutions to scale across borders. This regulatory inconsistency delays projects and increases costs, hampering the growth of GovTech firms, and the innovation in the Public Sector.

Data protection laws, like GDPR, add another layer of complexity. While GDPR is supposed to unify data protection, its enforcement differs widely across countries. This variability causes uncertainty for GovTech companies trying to comply with these laws in different regions.

Financial challenges further illustrate the impact of preferential procurement practices. GovTech companies need substantial funding to develop and grow. However, public funding is often limited and competitive, with a strong preference for local solutions. This local bias makes it difficult for companies to secure funding and expand into new markets. Innovation agencies, which should support the spread of innovative solutions, often focus on promoting domestic GovTech firms instead of facilitating the import of effective solutions from other countries.

Cultural factors also contribute to these preferential practices. Local public administrations often trust local providers more than foreign ones, preferring solutions that are more familiar over innovative technologies from abroad. Language barriers and differences in institutional structures, visibility and access to them, making it harder for foreign GovTech companies to gain acceptance by local procurers, reinforce this preference.

The support framework for GovTech companies shows similar tendencies. Many start-ups lack access to essential legal, financial and networking services, particularly when they try to enter new markets. The absence of platforms for displaying and scaling solutions across different countries limits the visibility of innovative GovTech products to their potential buyers.

Human capital is another area affected by protectionism. GovTech companies find it challenging to hire talent from different EU countries due to varying employment laws. This complexity restricts their ability to tap into a diverse talent pool and scale their operations across borders. Additionally, public officials often lack the necessary training to implement and manage GovTech solutions, further complicating the adoption of innovative technologies.

In conclusion, protectionism is a significant issue hindering the growth of the GovTech ecosystem in Europe. It affects regulatory consistency, financial access, cultural integration, support infrastructure and human capital development. The practices of many national innovation agencies, which prioritize exporting local solutions over importing foreign ones, exacerbate this problem. As it features now, GovTech seems to be more about (national) economic development and strengthening the local digital economy rather than about effective government modernisation and digitalisation across Europe. To foster a more innovative and interconnected GovTech landscape, it is crucial to address protectionist and related barriers and encourage a more open and collaborative approach to adopting GovTech solutions in the EU.

Below, the main areas affected by barriers and common influencing factors are summarised, together with some suggestions on how to address them by building on the information gathered during the research and feedback gained from the stakeholders involved in this study, and in consideration of the different requirements featuring the Interoperability Act.

5.1 Policy

The diversity of regulations across EU Member States creates substantial barriers to the seamless deployment of GovTech solutions. Despite the existence of overarching EU-wide regulations, individual countries often impose additional requirements that complicate compliance and scalability. To address these issues, it is essential to establish *EU-wide standard regulations* that rule this area to which Member States must adhere, thereby minimizing additional national requirements. By introducing also an *EU-level certification to validate GDPR compliance*, it would reduce the need for multiple proofs of compliance. Furthermore, mandating the *consistent application of crucial standards* like the UBO API would ensure uniformity and streamline GovTech related processes across borders.

5.2 Finance

GovTech companies face significant financial challenges, including high development and scaling costs, reliance on public funding and limited access to non-home market funding. *Simplifying the process for applying for funding in non-home markets* would facilitate easier access to financial resources, encouraging more GovTech companies to expand across borders. *Promoting the adoption of SaaS models* can reduce costs and enhance scalability by standardizing solutions. Additionally, implementing *dedicated funding programmes* designed to support the growth of GovTech start-ups would provide much-needed financial assistance, fostering innovation and expansion.

5.3 Culture

Cultural differences, including trust and credibility issues, resistance to change and language barriers, pose significant obstacles to the adoption and integration of GovTech solutions. Developing a certification process to enhance the credibility of GovTech companies across Europe would build trust with public administrations. Promoting cultural exchange programmes, particularly between young and old employees, can foster innovation and acceptance of new technologies. Establishing *national anchor places* for European GovTech localization would serve as hubs for these companies to build trust with public administrations and integrate culturally with local markets.

5.4 Support Framework

The lack of adequate support infrastructure, such as legal, financial and networking services, hinders the growth and scalability of GovTech companies. Establishing *dedicated institutions* to provide essential support to GovTech start-ups would help overcome initial barriers and promote growth. Developing *networking platforms* to facilitate collaboration and information sharing among GovTech companies and public administrations would enhance the visibility of GovTech solutions and create opportunities for partnerships. *Simplifying procurement processes* across the EU would reduce bureaucratic hurdles, making it more feasible for start-ups to secure and manage contracts with large governmental institutions.

5.5 Human Capital

Cross-border hiring challenges and a lack of IT training for public officials impede the growth and effectiveness of GovTech companies. *Standardizing employment laws* across the EU would simplify the *hiring process* for GovTech companies, enabling them to access a diverse talent pool. Providing comprehensive *IT training programmes for public officials* and identify *champions* would improve their ability to manage and implement GovTech solutions, facilitating smoother adoption and integration. Establishing an EU-wide agency focused on facilitating the hiring of skilled talent across borders would further support the human capital needs of GovTech companies.

5.6 Markets

Challenges in accessing decision-makers, visibility in procurement platforms and the high demand for proof of concept projects hinder the market expansion of GovTech companies. Creating *comprehensive public procurement directories* that are easily accessible to GovTech companies would improve visibility and facilitate connections with potential clients. Implementing policies to ensure the *translation of tenders* would make procurement opportunities more accessible to non-native speakers, promoting a more inclusive market. Establishing *GovTech showrooms across the EU* would provide platforms for companies to demonstrate their solutions to public sector officials, building trust and displaying product viability.

5.7 Technology

Inconsistent data standards, difficulties in integrating with local IT infrastructures and fragmented open-source policies pose significant technological barriers to the deployment of GovTech solutions. Developing and *enforcing uniform data standards and APIs across the EU* would ensure compatibility and interoperability, simplifying the integration process and enhancing scalability. *Encouraging the adoption of open data and open-source criteria* in public procurement would foster innovation and collaboration. *Strengthening patenting processes* for GovTech innovations would create a unique selling proposition for European solutions, encouraging technological advancement.

5.8 Conclusions and looking forward

This study illuminates the crucial role of GovTech in advancing the European Union's strategic goals of digital sovereignty and technological independence. Grounded in insights from 111 GovTech

company founders and supported by extensive literature and policy reviews, this research provides a detailed examination of the factors influencing interoperability and the cross-border scalability and effectiveness of GovTech solutions within the EU.

The findings underscore the significant challenges and opportunities within the GovTech landscape, offering critical insights for policymakers and stakeholders. We are now able to reflect the study is underlying research question: What factors critically influence cross-border GovTech practices in Europe, both positively and negatively? For answering this question, we refer to our theoretical framework and, specifically, to the seven interlinked areas of success: policy, finance, culture, support, human capital, markets and technology.

This study reveals that the key and most common factors hindering cross-border GovTech practices, reusability and scalability of innovative solutions are preferential procurement practices and regulatory inconsistencies leading to many other significant obstacles to the growth and spread of innovative public sector solutions across borders. Addressing these challenges guided by the recommended policy adaptations, may foster a more interconnected and efficient GovTech ecosystem driving innovation and the digital transformation of Public Administrations in Europe, the support and development of start-up and SMEs market and, ultimately, contributing to the EU's strategic ambitions of digital sovereignty and technological independence.

Looking forward, the GovTech sector in Europe holds immense potential for driving digital transformation in public services. However, realizing this potential requires joining forces and concerted efforts to address the challenges identified in this study. Future research should focus on conducting more in depth research on the interoperability of GovTech solutions across different national and regional systems, exploring the specific technical, legal and organizational challenges that hinder seamless integration and the transposition of EU regulations at all operational levels of public governance.

Additionally, understanding the cultural barriers that affect cross-border collaboration in GovTech is crucial, including the varying levels of digital literacy and public sector innovation readiness across countries.

Moreover, empirical data on the economic impact of cross-border GovTech collaborations would provide valuable insights for policymakers and stakeholders, helping to make a stronger case for investments in GovTech, and the harmonization of standards across the EU. Long-term studies that track the performance and impact of cross-border GovTech initiatives over time are also needed to understand their effectiveness and sustainability.

By addressing these areas with the insights we have gained through this study, and with the support of future research on the identified open issues influencing the provision of interoperable cross-border public services, the EU may improve the effectiveness, transparency and modernisation of the public sector.

Moving forward in this direction, will ensure that the Public Sector remains at the forefront in the provision of technological innovation and social and economic value, and would grant the needed support the development of a flourishing market for European Start-ups and SMEs. This will not only support the EU's strategic goals of digital sovereignty and technological independence, but also contribute to a more resilient and adaptable public sector capable of meeting the evolving needs of its citizens and businesses.

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List of abbreviations and definitions

Abbreviations	Definitions
AI	Artificial Intelligence
API	Application Programming Interface
GovTech	Government Technology
IEA	Interoperable Europe Act
JRC	Joint Research Centre
PoC	Proof of Concept
RQ	Research Question
SaaS	Software as a Service
SME	Small and Medium-Sized Enterprise
UBO	Ultimate Beneficial Owner
USP	Unique Selling Point

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